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Abstract

EARLY OPERATION OF THE C.E.G.B. NUCLEAR POWER STATIONS

by

*D.R.R.Fair
*R.L.Rutter

The paper states the objectives before the C.E.G.B. operators when generation commenced in June 1962. It records in tabular form the performance of Berkeley and Bradwell during the peak loading of the C.E.G.B. system in the first winter of operation, November 1962/February 1963. An analysis is made of the station utilisation from start-up to December 1963, and the limitations of output and availability are recorded and discussed. The reliability of nuclear generation following a careful period of commissioning is made clear.

A section deals with the operating costs, records the fuel, fuel handling and other operational and maintenance costs for both Berkeley and Bradwell and makes clear the very high incentive to maintain the nuclear stations at full power for the maximum time. The replacement fuel costs for Bradwell within the C.E.G.B. system for different times of the year are reported. There is discussion of the overall initial performance and comparisons are made between nuclear and non-nuclear effects.

Two of the nuclear limitations to performance are discussed in some detail; the case for a higher permissible fuel element temperature than that adopted at start-up and the case for a higher permitted graphite temperature. The case for the higher permissible fuel element temperature discusses the magnox ignition temperature and records the acceptance of 645°C for this purpose in dry carbon dioxide. The results of reassessments made of the transient rise

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* U.K. Central Electricity Generating Board.

in temperature in the reactor during certain postulated fault conditions, are presented. The case for the higher permissible graphite temperature involved consideration of the chemical reactivity of the graphite from which the graphite cores at Berkeley and Bradwell were constructed and an analysis of the results of sample measurements. The approach to the interpretation of air reactivity of graphite therefore emphasised two points. The first was that the value of graphite air reactivity should properly be associated with a given volume and probability, and the second was that more experimental information on the distribution of reactivity within graphite bricks was needed. A summary is made of the main arguments leading to the acceptance of both cases by the C.E.G.B. Nuclear Power Station Safety Committee and by the U.K. Inspectorate of Nuclear Installations.

The paper also reviews certain operational procedures and discusses the internal inspection of reactors and the case for the internal inspection of the nuclear boilers. New techniques for the former are described and new judgments concerning the latter are suggested.